UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN 19 2001

OFFICE OF
ENVIRONMENTAL INFORMATION

Mr. Philip S. Bell
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Dear Mr. Bell:

This letter responds to your May 14, 2001 email with attachment requesting guidance regarding the reporting requirements of section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA). Specifically, you are asking for guidance about manufacturing threshold determinations for metal compounds formed in a bath or other process. In addition, you want to know if the waters of hydration (or crystallization) in certain crystalline substances (*e.g.*, nickel sulfate hexahydrate crystals ($NiSO_4 \cdot 6H_2O$)) need to be counted toward threshold determinations.

With regard to your first question, the following is a copy of the comments EPA provided to the metal finishing industry in response to their proposed TRI reporting chapter to be included in their Environmental Guidance Manual:

Accounting for Metal Compounds Manufactured When Metal Ions Are Formed

How a facility accounts for the fact that the generation of a metal ion results in the manufacture of a metal compound depends on what is known about the process involved.

If a facility knows that they are making 3 different metal compounds of the same parent metal (*e.g.*, 3 different copper compounds) in a plating bath or other process then they need to consider the quantities of all three compounds that are manufactured. How they consider them depends on whether the three metal compounds are made from each other in the process or whether there is just a mixture of each of the three metal compounds.

If copper compound A is manufactured and then converted to copper compound B which is then converted to copper compound C then the quantities of each chemical manufactured are summed and applied towards the 25,000 pound manufacture threshold.

Example 1: If 10,000 pounds of copper are used to manufacture 21,173 pounds of copper chloride and then 29,535 pounds of copper nitrate are manufactured from the copper chloride and then 25,134 pounds of copper sulfate are manufactured from the copper nitrate, the total applied towards the manufacturing threshold for copper compounds is the sum of all three, 75,842 pounds. Since the total is above 25,000 pounds the facility is required to report its releases and other waste management quantities for copper compounds which is limited to the copper portion (≤ 10,000 lbs) of any copper compounds.

If copper compounds A, B, and C are not made from each other but represent the total of all of the copper compounds manufactured from a given amount of copper then the sum of these three copper compounds is what is applied towards the 25,000 pound manufacture threshold.

Example 2: 10,000 pounds of copper is used to manufacture three different compounds, 3,000 pounds of copper is used to manufacture copper chloride ($CuCl_2$), 3,000 pounds of copper is used to manufacture copper nitrate ($Cu(NO_3)_2$), and 4,000 pounds of copper is used to manufacture copper sulfate ($CuSO_4$). This would result in the manufacture of 6,352 pounds of copper chloride, 8,861 pounds of copper nitrate, and 10,054 pounds of copper sulfate. The total, 25,267 pounds, is applied towards the manufacturing threshold for copper compounds and since it is above 25,000 pounds the facility is required to report its releases and other waste management quantities for copper compounds which is limited to the copper portion (≤ 10,000 lbs) of any copper compounds.

If a facility does not know which compounds are formed in a plating bath or other process then the facility should use their knowledge about the process to determine what compound(s) are being formed.

Example 3: In a sodium cyanide copper bath, if no better information is available, it could be assumed that the copper in the bath is in the +1 oxidation state and that the compound formed is $Na_3Cu(CN)_4$. In this case the total amount of copper used from the anode would be used to determine how much of the copper compound was formed. If 5,000 pounds of copper were used then18,000 pounds of $Na_3Cu(CN)_4$ would have been manufactured which is below the 25,000 pound reporting threshold and no reporting would be required based solely on the manufacturing that occurred in this bath. Of course, if there is manufacturing of copper compounds elsewhere at the facility, such manufacturing would need to be considered along with the manufacturing that took place in the bath. If greater than 25,000 pounds of copper compounds were manufactured from all non-exempt activities taking place at the facility, then the facility would have to report for copper compounds.

However, if the facility knows that both Cu^{+1} and Cu^{+2} compounds are formed then they should account for that in their threshold determinations. How they account for it depends on whether they know if the copper is converted to a Cu^{+1} compound which then gets converted to a Cu^{+2} compound. If so, then the Cu^{+1} and Cu^{+2} compounds have been manufactured from each other and should be accounted for in threshold determinations consistent with Example 1 above. Another possibility is that some of the copper is converted to a Cu^{+1} compound and some to a Cu^{+2} compound but the Cu^{+1} compound is not converted to the Cu^{+2} compound. In this case the manufactured Cu^{+1} and Cu^{+2} compounds should be accounted for in threshold determinations consistent with Example 2 above.

With regard to your other question about the waters of hydration, you want to know whether the water portion of a hydrated compound needs to be considered for EPCRA section 313 reporting purposes. Some chemicals, mainly inorganic and organic salts, may contain what is referred to as water of crystallization. Water of crystallization is water that is retained within the crystalline structure of a compound. Such compounds are usually referred to as hydrates. For example, copper (II) sulfate ($CuSO_4$) can also be prepared as the pentahydrate ($CuSO_4 \cdot 5H_2O$), with each chemical having its own name and CAS number. For purposes of reporting under EPCRA section 313, EPA believes that the most appropriate, and least confusing way to report on hydrated compounds is to exclude the weight of the water in all calculations. Therefore, the molecular weight of the hydrated compound should not include any contribution from the water molecules.

Example: The molecular weight of copper (II) sulfate pentahydrate ($CuSO_4 \cdot 5H_2O$) is 249.6 grams/mole. Since the molecular weight of water is 18 grams/mole, if the water is excluded then the adjusted molecular weight is: 249.6 - (5 x 18) = 159.6 grams/mole. Thus, pounds of the hydrate can be multiplied by 159.6/249.6 (*i.e.*, 0.64) in order to get the corrected non-hydrate weight.

I hope this information is helpful to you in understanding the reporting requirements of section 313 of EPCRA. If you have any other questions, or desire further information, please call Larry Reisman, of my staff, at 202.260.2301.

Sincerely,

John M. Dombrowski

John M. Dombrowski, P.E., Chief
TRI Regulation Development Branch